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EXAMINER	
EMPIE, NATHAN H	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/526,497	KUBELBECK ET AL.	
	Examiner	Art Unit	
	NATHAN H. EMPIE	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2, 4, 6-8, 10 - 12,14,16-28* is/are pending in the application.

4a) Of the above claim(s) *17 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2, 4, 6-8, 10 - 12,14,16, and 19-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/20/08 has been entered. Claims 2, 4, 6-8, 10 - 12,14,16, and 19-28 are currently pending, claims 1,3, 5, 9, 13, and 15 are cancelled and claims 17 and 18 stand withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As currently presented, the preamble of claim 6 reads "An etching medium according to claim 2..."; however, claim 2 is directed toward a process for etching, additionally, claim 23 (which depends from claim 6) recites "A process according to claim 6...". Additionally, previous versions of the claims (such as filed on 12/13/07) had made the appropriate correction in claim 6 from "an etching medium" to "a process", which appears to have been mistyped while composing the current amendments. As all of the associated claims to claim 6 are concerned with "a process",

for purposes of examination, the examiner is interpreting claim 6 as "*A process* according to claim 2..."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4, 6-8, 10-12, 19-24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szlufcik et al (US 2004/0063326; hereafter Szlufcik) in view of Yamazaki (US patent 6,133,119; hereafter Yamazaki) and DeJager (US patent 5,258,777; hereafter DeJager).

Claims 8, and 4: Szlufcik teaches a process for the etching of silicon surfaces and layers (abstract, [0026]) comprising applying a printable thickened, alkaline liquid etching medium (caustic etching paste, they are deemed printable as they are applied by a printing process ([0016] [0065])) over the entire surface area of said surface or layer or in accordance with the etch structure mask specifically only to the area of the surface where etching is desired ([0019], [0027], [0055], abstract, [0064-0072]).

Szlufcik further teaches wherein said etching medium acts at a temperature in the range of from 70 to 150°C and / or is activated by the input of energy by the activation of heat (see, for example, a KOH etchant paste is activated at 95°C [0070], Szlufcik additionally teaches that the substrate is not significantly etched at room

temperature, and that the input of energy will increase the etching action of the etchant ([0058])).

Wherein said etching medium comprises an etching component that is an organic or inorganic base (a basic or alkaline, etching agent such as KOH, NaOH, NH_4OH [0019], [0064]) and having a concentration of from 5 to 48% by weight, based on the total amount of said etching medium (see, for example, 15% by weight of KOH in solvent (water), [0067]).

Szlufcik further teaches wherein the solvent is water, in an amount of from 10 to 90% by weight (see for example [0067], where the solvent is approximately between 80-89% of the etching paste). Szlufcik does not however, explicitly teach wherein the etching medium further comprises at least one other solvent. DeJager teaches that it is well known in the art to predictably etch silicon with a KOH etching agent diluted in a mixture of water and isopropanol (col 4 lines 5 -10). As both Szlufcik and DeJager have taught KOH / water etching compositions for predictably etching silicon surfaces it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for isopropanol to achieve the predicable result of etching a silicon surface.

And removing said medium after an exposure time (removal is preferably done at room temperature [0058]). Szlufcik additionally teaches that the substrate is not significantly etched at room temperature, and that the input of energy will increase the etching action of the etchant ([0058]). But Szlufcik is silent as to the duration of exposure time, so an exposure time of from 30s to 5 min in not explicitly taught. When

a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference. Yamazaki teaches a process for the etching of silicon surfaces wherein an alkaline liquid (NaOH) is selected as an etchant (col 11 lines 44 -64). Yamazaki further teaches a suitable and predictable NaOH etchant exposure time of 5 min (col 11 lines 44-64). It would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the etchant exposure time of 5 min as taught by Yamazaki into the method taught by Szlufcik, as Szlufcik is silent as the to the elevated etchant exposure time and the teaching of Yamazaki satisfies the deficiencies of Szlufcik with a common elevated etchant exposure time. Additionally, one of ordinary skill in the art would appreciate that the exposure of a surface to an etchant would influence the depth of etching, therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an etchant exposure time within the claimed range since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 2: Szlufcik further teaches wherein the etching medium comprises at least one solvent (water), and thickeners ([0063]). As claim is currently written additives are optional, so no teaching of an additive would meet the limitation of claim 2.

Claim 6: Szlufcik further teaches wherein said thickener is, for example, cellulose ([0063]).

Claim 7: Szlufcik further teaches wherein said additive is an adhesion promoter and is 0 wt% based on total amount of the etching medium (As Szlufcik does not teach adding an adhesion promoter, then 0 wt% is taught).

Claims 10: Szlufcik further teaches wherein said etching medium acts at a temperature in the range of from 70 to 150°C and / or is activated by the input of energy by the activation of heat (see, for example, a KOH etchant paste is activated at 95°C [0070], Szlufcik additionally teaches that the substrate is not significantly etched at room temperature, and that the input of energy will increase the etching action of the etchant ([0058])).

Claim 11: Szlufcik further teaches wherein the etching medium (paste) is applied to the surface by a printing method such as manual printing ([0016] [0065] wherein the examiner further takes official notice that manual printing is well known form of a printing method).

Claim 12: Szlufcik further teaches wherein the etching medium (paste) is rinsed off with a solvent (water) when etching is complete ([0058])

Claim 19: Szlufcik further teaches wherein solvent, is in an amount approximately between 80-89% of the etching paste ([0067]). Szlufcik does not explicitly teach the solvent from 15 to 85% by weight of the etching medium, but it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a solvent amount from between 15-85% by weight because in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 20: Within claim 8 from which claim 20 depends, carboxylic acid ester is presented as one of a group of solvents used with water. So Szlufcik in view of Yamazaki and DeJager has taught wherein the solvent is a mixture of water and isopropanol (one of the other suitable constituents within the claimed group, as the examiner is not relying on carboxylic acid ester as the solvent, the further limitation on carboxylic acid ester in not relevant to the rejection as presented).

Claim 21: Within claim 2 from which claim 21 depends, said additive is presented as optional so this further limitation of a specific additive is not relevant to the rejection as presented wherein the other limitation have already been met in the rejection of claim 2 (described above).

Claims 22, 24: Szlufcik further teaches wherein the base constituent (see, for example KOH) is in an amount between 10-15% by weight of the etching paste medium ([0067]).

Claims 23, 26: Szlufcik further teaches wherein the thickener is in an amount between 1-5% by weight of the etching paste medium ([0067]).

Claim 27: Szlufcik in view of Yamazaki and DeJager teaches wherein the etching medium comprises at least one solvent (see, for example, water /isopropanol, taught above), and thickeners ([0063]). As claim is currently written additives are optional, so no teaching of an additive would meet the limitation of claim 27. Szlufcik further teaches wherein solvent (water / isopropanol), is in an amount approximately between 80-89% of the etching paste ([0067]). Szlufcik does not explicitly teach the solvent from 15 to 85% by weight of the etching medium, but it would have been obvious to one of

ordinary skill in the art at the time of invention to have selected a solvent amount from between 15-85% by weight because in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Szlufcik further teaches wherein the thickener is in an amount between 1-5% by weight of the etching paste medium ([0067]).

Claim 28: Szlufcik further teaches wherein said source of heat is an IR lamp (infrared dryer, [0056]).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Szlufcik in view of Yamazaki and DeJager as applied to claim 8 above, and further in view of Ohlsen et al. (US patent 6,641,948 B1; hereafter Ohlsen).

Claim 25: Szlufcik further teaches wherein the base constituent (see, for example KOH) is in an amount between 10-15% by weight of the etching paste medium ([0067]). Szlufcik does not explicitly teach wherein the base constituent is in an amount between 30-40% by weight of said etching medium. Prior art Ohlsen teaches KOH etching mediums possessing 30%wt KOH by weight of etching medium can predictably etch silicon substrates at a rate of 1.65-1.75 micron / min (col 23 lines 20 - 25). Because both Ohlsen and Szlufcik in view of Yamazaki and DeJager teach method of etching silicon with KOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been

obvious to one of ordinary skill in the art at the time of invention to have incorporated a KOH % of 30 wt% by weight of etching medium, as taught by Ohlsen, as the amount of KOH in the method of Szlufcik in view of Yamazaki and DeJager as Ohlsen teaches a predictable method of etching silicon at a rate of 1.65-1.75 micron / min, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP2144.05II A).

Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of Ichinose et al (US patent 5,688,366; hereafter Ichinose), Skorupski et al (US 2002/0162218; hereafter Skorupski) and DeJager.

Claim 14: Yamazaki teaches a method for etching of silicon surfaces and layers for isolation of the pn transition in solar cells comprising applying an etching medium to the surface of said silicon or a layer for isolation of the pn transition in a solar cell (texture 106 to the uppermost portion of silicon substrate 105, Fig 2A, (col 11 lines 44-64); and it is preferable that a portion in the vicinity of the surface of the n-type conductive region 107 is etched and removed by sodium hydroxide (not shown), (col 12 lines 14 – 28).

Yamazaki does not teach a thickened etching medium. Ichinose teaches a chemical etching process with an alkali solution mixed with an additive to form a paste (col 3 lines 35-52). The motivation to thicken the etching medium taught by Yamazaki is provided by Ichinose that teaches that etching with a paste "has excellent selectivity,

and does little to no damage to the non-etching region" (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

Yamazaki further teaches wherein the base constituent (see, for example NaOH) is in an amount of about 2% of the etching paste medium (col 11 lines 43 – 64). Yamazaki does not explicitly teach wherein the base constituent is in an amount between 5 to 48 % by weight of total amount of said etching medium. Prior art Skorupski teaches NaOH etching mediums possessing between 8 and 16 %wt NaOH by weight of etching medium can suitably and predictably etch silicon substrates ([0020-022]). Because both Skorupski and Yamazaki in view of Ichinose teach method of etching silicon with NaOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a NaOH % of 8 to 16 wt% by weight of etching medium, as taught by Skorupski, as the amount of NaOH in the method of Yamazaki in view of Ichinose as Skorupski teaches the suitability and predictability of etching silicon surfaces within this

taught concentration range, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP 2144.05II A).

Yamazaki in view of Ichinose and Skorupski have taught (above) wherein alkaline-hydroxide etchant is diluted in a water solvent, but none of these references explicitly teach wherein the etching medium further comprises at least one other solvent. DeJager teaches that it is well known in the art to predictably etch silicon with a alkaline-hydroxide etching agent diluted in a mixture of water and isopropanol (col 4 lines 5 -10). As both DeJager and the method of Yamazaki in view of Ichinose and Skorupski have taught alkaline-hydroxide / water etching compositions for predictably etching silicon surfaces it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for isopropanol to achieve the predicable result of etching a silicon surface.

Claim 16: Yamazaki teaches a method for etching of silicon surfaces and layers of solar cells for improving the antireflection behavior comprising applying an etching medium to the surface of said silicon or layer of a solar cell for improving the antireflection behavior (the textured surface (106) is formed by etching, whereupon a reflection preventing film (109) is formed (col 6 lines 56-60, col 12 lines 29-39)) where the resulting etched surface structure will influence the effectiveness of the antireflective film. Yamazaki in view of Ichinose teaches the etching medium is a thickened alkaline liquid (as described in the rejection to claim 14 above). Yamazaki in view of Ichinose and Skorupski teaches the etching medium possesses a base (NaOH) concentration of

from 8 to 16% by weight, based on total amount of said etching medium (as described in the rejection to claim 14 above).

Yamazaki in view of Ichinose and Skorupski have taught (above) wherein alkaline-hydroxide etchant is diluted in a water solvent, but none of these references explicitly teach wherein the etching medium further comprises at least one other solvent. DeJager teaches that it is well known in the art to predictably etch silicon with a alkaline-hydroxide etching agent diluted in a mixture of water and isopropanol (col 4 lines 5 -10). As both DeJager and the method of Yamazaki in view of Ichinose and Skorupski have taught alkaline-hydroxide / water etching compositions for predictably etching silicon surfaces it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for isopropanol to achieve the predicable result of etching a silicon surface.

Claims 2, 4, 6-8, 10-12, 19-24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein et al (machine translation of DE10101926; hereafter Klein) Yamazaki, and DeJager.

Claims 2, 8, and 10: Skorupski teaches the method of manufacturing circuit boards comprising etching silicon substrates and substrates with compositions containing silicon by applying an etchant or the surface of the substrates ([0007-0020]). Wherein the etching of silicon surfaces and layers is performed by an alkaline liquid (aqueous alkaline solution) typically in a concentration range of between about 5% to 25% by weight of the etchant medium ([0021-0022]). Skorupski teaches that duration of

the etching step is determine by the chemical composition of the substrate, and is generally from about 10 sec to 4 min. Skorupski does not explicitly teach an exposure time of from 30 sec to 5 min, but it would have been obvious to one of ordinary skill in the art at the time of invention to have selected an exposure time of from 30 sec to 5 min since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Skorupski does not teach that the alkaline solution is thickened. Klein teaches a chemical etching process designed to etch silicon oxide surfaces wherein the etchant is mixed with an additive to form a paste (abstract, pg 2). Klein additionally teaches that the motivation to thicken the etching medium is that it allows a printable, homogeneous etching paste which is significantly less expensive than conventional wet and dry etching methods in the liquid and gas phases (pg 2), additionally use of a thickened paste allows for a high degree of automation and surface design (pg 2, 5). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have thickened, as taught by Klein, the etching medium taught by Skorupski to enable a printable etching process which is significantly less expensive, and possesses a high degree of automation and surface design.

Skorupski in view of Klein teaches the process of claim 8 (above) wherein Skorupski has taught the etching medium comprises at least one solvent (water, as the etchant is an aqueous alkaline solution) [0022]. And Klein teaches the addition of a thickener to make the etching solution a paste (pg 4). Additionally Klein teaches that a

variety of additives can have a positive effect on the printability of the printing paste (pg 4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated additives as taught by Klein, in to the method of Skorupski in view of Klein as the taught additive can improve the printability of the etching paste.

Skorupski further teaches the etchant is capable of etching by heating the etchant to temperatures between 40 to 65°C, but is silent as to the etchants performance at a temperature of between 70 to 150°C. Yamazaki teaches an aqueous alkaline etchant, etching a silicon surface at a temperature of 80°C (col 11 lines 43 – 64). Therefore Yamazaki proves that aqueous alkaline etchants are predictably effective at a temperature of 80°C, and because both Yamazaki and Skorupski in view of Klein teach an aqueous alkaline etchant to etch a silicon surface, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute the etching temperatures between the two method to achieve the predictable result of etching a silicon surface.

Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4). The combination of these components would leave between 55 and 87% of solvent by weight of the total amount of the etching medium. Skorupski does not however, explicitly teach wherein the etching medium further comprises at least one other

solvent. DeJager teaches that it is well known in the art to predictably etch silicon with a KOH etching agent diluted in a mixture of water and isopropanol (col 4 lines 5 -10). As both Skorupski and DeJager have taught aqueous alkaline etching compositions for predictably etching silicon surfaces it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for isopropanol to achieve the predicable result of etching a silicon surface.

Claim 4: Skorupski in view of Klein, Yamazaki, and DeJager, teach the process of claim 8 (above), wherein Skorupski further teaches wherein the etching component is, for example, NaOH and KOH ([0022]).

Claim 6: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 2 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by weight of the total etching medium (pg 4) and that the thickener is, for example, hydroxyethylcellulose (pg 4).

Claim 7: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 2 (above), wherein Klein further teaches wherein the additive is, for example, a thixotropic agent (pg 4).

Claim 11: Klein further teaches the thickened etching paste is suitable for printing processes such as screen printing, stamping, and ink-jet printing (pg 5)

Claim 12: Skorupski further teaches rinsing off the etchant with deionized water ([0026]).

Claim 19: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 5 (above), wherein Skorupski in view of Klein, Yamazaki, and DeJager taught

that between 55 and 87% of solvent (water) by weight of the total amount of the etching medium (in the rejection to claim 5 above). Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 20: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 5 (above), within claim 5 from which claim 20 depends, carboxylic acid ester is presented as one of a group of solvents used together or separately. Skorupski teaches wherein the solvent is water (one of the other suitable constituents within the group, as the examiner is not relying on carboxylic acid ester as the solvent, the further limitation on carboxylic acid ester in not relevant to the rejection as presented).

Claim 21: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 5 (above), wherein Klein further teaches wherein the additive is, for example, a thixotropic agent (pg 4).

Claims 22 and 24: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 8 (above), wherein Skorupski teaches preferably the weight % of alkaline etchant material is about 10% to about 20% by weight of the total amount of etching medium ([0022]).

Claim 23: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 6 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by weight of the total etching medium (pg 4), but does not explicitly teach the thickener is from 1 to 10% by weight, based on the total amount of the etching medium. It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the concentration of thickener is from 1 to 10% by weight, based on the total amount of the etching medium since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 26: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 8 (above), wherein Klein further teaches preferably the weight % of thickener is about 0.5 to 25% and preferably 3 to 20% by weight of the total etching medium (pg 4).

Claim 27: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 24 (above), wherein Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% - to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4) to form a printable etchant paste (abstract, pg 5). The combination of these components would leave between 55 and 87% of water by weight of the total amount of the etching medium. Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a

concentration of solvent within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Skorupski further teaches the etchant is capable of etching by heating the etchant to temperatures between 40 to 65°C, but is silent as to the etchants performance at a temperature of between 70 to 150°C. Yamazaki teaches an aqueous alkaline etchant, etching a silicon surface at a temperature of 80°C (col 11 lines 43 – 64). Therefore Yamazaki proves that aqueous alkaline etchants are predictably effective at a temperature of 80°C, and because both Yamazaki and Skorupski in view of Klein, Yamazaki, and DeJager teach an aqueous alkaline etchant to etch a silicon surface, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute the etching temperatures between the two methods to achieve the predictable result of etching a silicon surface.

Claim 28: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 10 (above), wherein Skorupski in view of Klein, Yamazaki, and DeJager teach an etching medium that can be activated by the input of heat. Skorupski , Yamazaki and DeJager are silent as to the source of the heat, so they do not explicitly teach a source as an IR lamp or a hotplate. Klein teaches a method of using an energy / heat activated etchant wherein the input of energy is supplied in the form of radiant heat via an IR lamp, capable of heating to 300°C (pg 2). It would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the IR lamp as the heat source, as taught by Klein into the method of Skorupski in view of Klein, Yamazaki,

and DeJager, as the primary reference, Skorupski, is silent, and when a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference, additionally Klein teaches a predictable means to apply heat in upwards of 300°C to an etchant paste deposited on a substrate.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein, Yamazaki, and DeJager as applied to claim 8 above, and further in view of Ohlsen.

Claim 25: Skorupski in view of Klein, Yamazaki, and DeJager teach the process of claim 8 (above), wherein Skorupski further teaches wherein the base constituent (see, for example KOH) is in an amount between 5 and 25%, and more precisely 8 to 12% by weight of the etching paste medium ([0022]). Skorupski does not explicitly teach wherein the base constituent is in an amount between 30-40% by weight of said etching medium. Prior art Ohlsen teaches KOH etching mediums possessing 30%wt KOH by weight of etching medium can predictably etch silicon substrates at a rate of 1.65-1.75 micron / min (col 23 lines 20 - 25). Because both Ohlsen and Skorupski in view of Klein teach method of etching silicon with KOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a KOH % of 30 wt% by weight of etching

medium, as taught by Ohlsen, as the amount of KOH in the method of Skorupski in view of Klein, Yamazaki, and DeJager as Ohlsen teaches a predictable method of etching silicon at a rate of 1.65-1.75 micron / min, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP2144.05II A).

Response to Arguments

Applicant's arguments, filed 6/20/08, with respect to the rejection(s) of claim(s) 2, 4, 6-8, 10 - 12,14,16, and 19-28 under USC 103 have been fully considered and overcome the prior rejections in view of the amendment because of the limitation requiring a mixture of solvents comprising water and at least on other claimed organic solvent. However, upon further consideration, a new ground(s) of rejection is made in view of the above references.

Applicant's arguments directed to the amendment "printable" are addressed as follows:

Rejections made in view of Szlufcik as primary reference: Szlufcik has explicitly taught wherein the etchant is applied by a printing method (see, for example, abstract), therefore the examiner asserts that the etchant would in fact be printable since it is applied via printing.

Rejections made in view of Yamazaki as primary reference, and Skorupski as primary reference: In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that

the features upon which applicant relies (i.e., the application of etchant onto the surface structured as very fine lines or layers, or the) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The limitation of printable is interpreted as "able to be printed", the above rejections have taught thickened liquid etchants (when considering the references as a whole as they are currently applied, and not individually), and the examiner asserts that any liquidus material would be inherently printable.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner further maintains that Ichinose does teach alkali etchants (col 3 lines 35 – 65). And additionally that Ichinose teaches the motivation for thickening the etchant taught by Yamazaki: Ichinose teaches that etching with a paste "has excellent selectivity, and does little to no damage to the non-etching region" (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to

have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

In response to applicant's argument that Klein is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Klein is in the field of applicant's endeavor, namely a novel etching media in the form of etching pastes and use of such media.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 7:00- 4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. H. E./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792